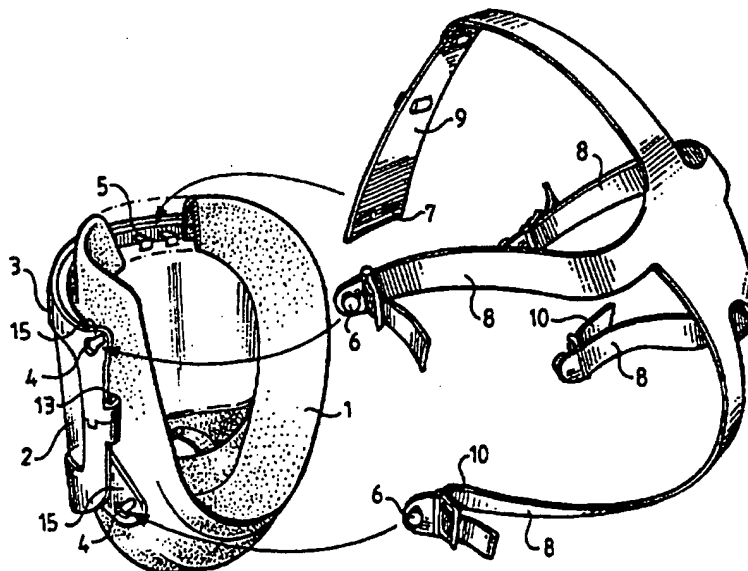




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(21) International Application Number: PCT/SE96/00239 (22) International Filing Date: 21 February 1996 (21.02.96)  (30) Priority Data: 9500656-5 22 February 1995 (22.02.95) SE  (71) Applicant (for all designated States except US): COMASEC INTERNATIONAL S.A. [FR/FR]; 6-10, quai de Seine, F-93200 Saint-Denis (FR).  (72) Inventors; and (75) Inventors/Applicants (for US only): EKSTRÖM, Staffan [SE/SE]; Jupitervägen 43, S-181 63 Lidingö (SE). WETTERGREN, Hans [SE/SE]; Bränningestrandsvägen 13 A, S-151 39 Södertälje (SE). MAXWELL, Ian [GB/GB]; Coppice Hanger, Church Hill, Pulborough, West Sussex RH20 1AB (GB).  (74) Agents: AXELSSON, Rolf et al.; Kransell & Wennborg AB, P.O. Box 27834, S-115 93 Stockholm (SE).	(81) Designated States: AU, CA, JP, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  Published With international search report. In English translation (filed in Swedish).	

(54) Title: FACE MASK



## (57) Abstract

A face mask for use in an unbreathable atmosphere or beneath the surface of water and intended for connection to a breathing gas container or to an air purifier. The mask includes a pliable sealing facepiece (1) which is intended to be pressed sealingly against the wearer's face, a framed viewing visor inserted in and sealingly connected to the pliable facepiece (1), and straps (8, 9) for securing the face mask to the head of the wearer. The straps are fastened in the frame (3) of the visor (2) such that the frame (3) will exert pressure on the sealing facepiece (1) when the straps (8, 9) are tightened on the wearer's head.

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## FACE MASK

The present invention relates to a face mask for use in unbreathable atmospheres or under water and which are intended for connection to a breathing gas container or to an air purifier, wherein the face mask includes a pliable facepiece which is pressed sealingly against the wearer's face, a framed viewing visor fitted in the pliable facepiece and connected sealingly thereto, and straps for securing the face mask to the wearer's head.

Face masks of this kind are included in many different types of breathing equipment used, for instance, by firemen, industrial personnel who work in toxic environments, and divers. In certain cases, there are used solely face masks which are secured to the wearer's head by means of straps, while in other cases the face mask is used together with a helmet, and is preferably secured to the helmet in a manner which enables helmet and mask to be handled as a unit. In this latter case, the head straps form no useful purpose, but are more or less an obstacle which makes the helmet uncomfortable to wear.

A fundamental requirement of a face mask is that it seats sealingly against the wearer's face, so as to prevent toxic gases from entering the mask, for instance. For this reason, the sealing facepiece in which the viewing visor is seated is conveniently comprised of a soft rubber material which will conform effectively to the facial contours of the wearer. This soft rubber material will also be elastic to a certain degree.

In the case of known face masks of this kind, the securing head straps are secured in the rubber material of the facepiece, see for instance US-A 4,714,077. This strap-securing method, however, can result in the ingress of toxic gases for instance as a result of the rubber material

becoming slightly stretched at the strap attachment points, as the straps are tensioned, therewith impairing the tightness of the fit against the facial contours of the wearer.

5 The known masks are also constructed so that when disconnecting the mask-securing head straps in conjunction with connecting the mask to a helmet, the band-like head strap attachment parts remain fixed to the face mask. In particular, the face mask will normally include such a part centrally over the forehead of the wearer for attachment to a crown strap. The person using the face mask has normally been forced to cut off these band-like parts, so that the helmet will sit comfortably on the person's head. This means, however, that the face mask cannot be reused separately from the helmet, but must thereafter always be worn together therewith.

One object of the present invention is to provide a face mask with which the problem relating to a poorer fitting facepiece as a result of stretching the rubber material from which the facepiece is made has been eliminated.

Another object of the invention is to provide a face mask that can be used as a separate item but which, when necessary, can be adapted for integrated and comfortable use together with a helmet without influencing the mask.

The first of these objects is achieved with a face mask of the kind defined in the first paragraph which, in accordance with the present invention, is characterized in that the straps are fastened in the visor frame, such that the frame will exert a pressing force on the facepiece when the straps are fastened around the wearer's head.

35 In the case of a face mask of this construction, the whole of the pliable, sealing facepiece will be pressed uniformly against the wearer's face without danger of the shape of the

facepiece being changed at the belt attachment points.

5 The second of the aforesaid objects is achieved with a face mask of the aforescribed kind by fastening the straps directly to the visor frame, such that when the straps are removed from the mask, there will remain no coupling parts that can make it difficult to use the mask together with a helmet. In this regard, it is preferred to provide the visor frame with a quick coupling means which will coact with  
10 corresponding means on the straps so as to enable mask and straps to be coupled to one another quickly and simply.

This enables the mask to be used as a separate article and therewith to be secured firmly by means of the straps, or to  
15 be used together with a helmet without remaining parts of the attachment belts making wearing of the helmet uncomfortable.

Other characteristic features of the invention are apparent from the following Claims.

20 The invention will now be described in more detail with reference to an exemplifying embodiment thereof and also with reference to the accompanying drawing, in which

25 Fig. 1 illustrates an inventive face mask with the securing straps disconnected; and

Fig. 2 illustrates the mask when used together with a helmet.

30 The illustrated face mask includes a sealing facepiece 1 made of a pliable and supple rubber material or some like material which when pressed against the wearer's face will conform to the facial contours of the wearer. Inserted in the rubber facepiece is a viewing visor 2 which is surrounded by an  
35 essentially rigid frame 3 to which the facepiece 1 is sealingly connected.

The frame 3 is provided with quick-coupling means, which in the illustrated embodiment are comprised of keyhole openings 4 and hooks 5 which are intended to coact with pegs 6 and slots 7 respectively on respective ends 9 of the straps 8. The openings 4 are provided in attachment lugs 15 which project out from the visor frame 3 and which facilitate coupling of the straps to the facepiece.

The straps 8, 9 are provided with respective buckles 10, or like devices, which enable the lengths of individual straps 8, 9 to be adjusted.

When the mask is to be used separately, i.e. without the helmet, the head straps 8, 9 are fastened to the visor frame as shown in Fig. 1. The straps are then placed over the wearer's head and adjusted to the length desired. The straps will therewith exert a holding force on the visor frame 3, which in turn will press the pliable sealing facepiece 1 uniformly against the wearer's face. This abutment pressure can be adjusted readily, by changing the lengths of the straps.

A face mask worn and tightened in this way will seal very effectively against the wearer's face and therewith prevent the ingress of toxic gas, for instance.

When the mask is to be used together with a helmet 11, the straps 8 and 9 are disconnected from the mask and then connected to the helmet with the aid of resilient arms 12, see Fig. 2, so that the face mask and the helmet will form an integrated unit. It is important in this regard that no part of the straps, such as the part 9, remains on the face mask, since the helmet would otherwise feel uncomfortable when worn.

A very effective seal is obtained between the pliable rubber facepiece 1 and the wearer's face when the mask is worn in

accordance with Fig. 2, as a result of the arms 12 used to secure the face mask to the helmet are mounted on the visor frame 3, e.g. with the aid of bolts 13, which connect the two halves of the visor frame.

5

The fastener arms 12 may have any desired construction to suit different helmets, although the arms will preferably have a springiness that will provide a correct abutment pressure against the wearer's face when the helmet is secured on the wearer's head with the aid of the chin strap 14.

10

The arms 12 can be easily removed when again wishing to use the face mask as a separate item, whereafter the head straps are again connected to the visor frame with the aid of the aforesaid quick-coupling means. This enables the face mask to be used with great variation in different circumstances.

15

Although the invention has been described with reference to a specific embodiment thereof, it will be understood that many variations and modifications can be made in different aspects with regard to design, among other things, within the scope of the following Claims. For instance, the illustrated and described quick-coupling means can be replaced with other types of known coupling means.

20

## CLAIMS

1. A face mask for use in an unbreathable atmosphere or beneath the surface of water and intended for connection to a breathing gas container or to an air purifier, wherein the face mask includes a pliable sealing facepiece (1) intended for sealing abutment with the wearer's face, a viewing visor provided with a frame (3) and fitted in and sealingly connected to the pliable facepiece (1), and straps (8, 9) for securing the face mask on the wearer's head, characterized in that the head straps are fastened to the visor frame (3) such that said frame (3) will exert pressure on the sealing facepiece (1) when the straps (8, 9) are tightened on the wearer's head.
2. A face mask according to Claim 1, characterized in that the straps (8, 9) are fastened directly to the visor frame (3) such that when the straps are removed, no coupling parts will remain on the mask that can render difficult its use together with and its attachment to a helmet (11).
3. A face mask according to Claim 2, characterized in that the visor frame (3) is provided with quick-coupling means (4, 5) which coact with corresponding means (6, 7) on the straps (8, 9) such as to enable the mask and straps to be connected together in a simple and quick fashion.
4. A face mask according to Claim 3, characterized in that the quick-coupling means include keyhole-like openings (4) and pegs (6) having enlarged heads for locking engagement in said openings.
5. A face mask according to Claim 4, characterized in that the openings (4) are provided in attachment lugs (15) which project out from the visor frame (3); and in that said pegs (6) are provided on the ends of the fastening straps (8).



Fig. 1

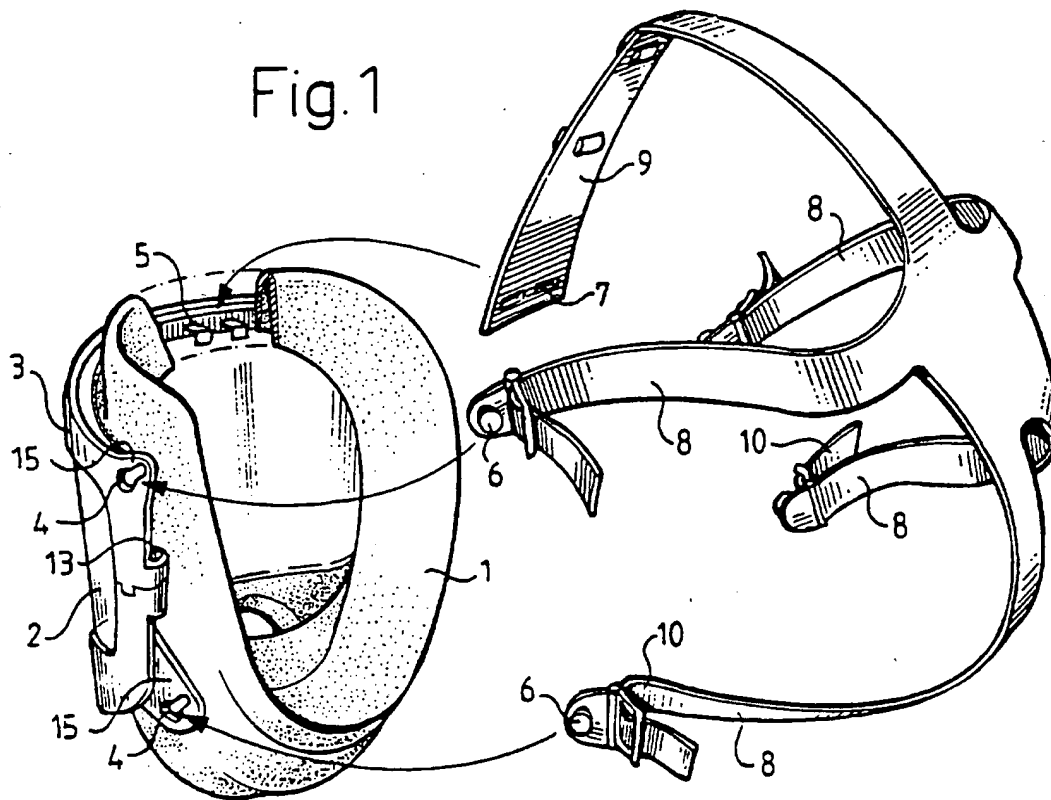
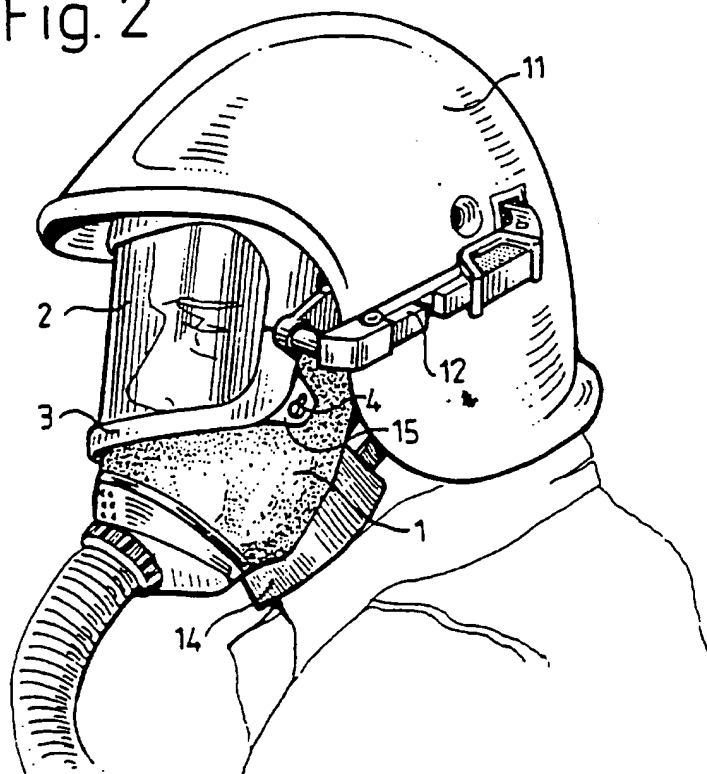


Fig. 2



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 96/00239

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: A62B 18/08

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

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IPC6: A62B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2569451 A (J.BROWNE), 2 October 1951 (02.10.51), column 1, line 21 - line 35, figures 1,5,9 --	1
Y	US 3545436 A (ROBERT L. HOLLOWAY), 8 December 1970 (08.12.70), column 2, line 7 - line 41, figure 1 --	1-2,5
A	EP 0297234 A1 (AUERGESELLSCHAFT GMBH), 4 January 1989 (04.01.89), column 1, figures 1-6 --	1-5



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## INTERNATIONAL SEARCH REPORT

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Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 0105813 A1 (ETS. JEAN GALLET ET FILS), 18 April 1984 (18.04.84), figures 1,2, abstract	1
A	-- -----	2-3

# INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US-A-	2569451	02/10/51	NONE	
US-A-	3545436	08/12/70	NONE	
EP-A1-	0297234	04/01/89	DE-A, C, C	3721662 12/01/89
			DE-A-	3865110 31/10/91
			US-A-	4926854 22/05/90
EP-A1-	0105813	18/04/84	SE-T3-	0105813
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